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METHOD FOR TREATING WASTE PHOTOGRAPHIC DEVELOPING SOLUTION

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Claims

1. A method for treating waste photographic developing solution characterized by the fact that a halogen-containing chemical agent that is adjusted for gradual addition is added to the

waste photographic developing solution to prevent problems of slime generated in said waste solution.

2. The method for treating waste photographic developing solution described in Claim 1, characterized by the fact that the halogen-containing chemical agent is a compound that generates hypochlorous acid, hypobromous acid, or hypoiodous acid in water.

3. The method for treating waste photographic developing solution described in Claim 1 or 2, characterized by the fact that the halogen-containing chemical agent is a mixture of dibromodimethyl hydantoin and dichlorodimethyl hydantoin.

Detailed explanation of the invention

This invention pertains to a method for treating waste solution which can prevent problems of slime generated in the waste photographic developing solution. More specifically, this invention pertains to a treatment method characterized by the fact that it can prevent problems of slime generated in waste photographic developing solution by adding a halogen-containing chemical agent that is adjusted for gradual addition to the waste solution.

In the photographic steps of development, fixing, water washing, etc., because the waste solution contains a lot of microbes, nutrients, and gelatin, and the water temperature in the water washing step is 20-35°C, microbes may reproduce easily. For example, let's look at the water washing tank. Slime may occur easily in its water discharge tube, etc., and clogging and other problems may occur in the water discharge tube due to slime. However, recently, from the viewpoint of energy conservation, the hot discharged water from the first water washing tank is used as the heat source of the freshly supplied washing water. In this case, the discharged water flows through a heat exchanger followed by disposal. Consequently, problems of slime that used to occur in the conventional discharged water system tend to occur in the heat exchanger portion, too.

Problems of slime lead to a decrease in the efficiency of the heat exchanger. In the extreme scenario, the pipeline portion in the heat exchanger portion is clogged, so that the function cannot be performed at all. As a result, the system has to be disassembled for cleaning on a regular basis. Such disassembling/cleaning leads to a decrease in productivity, and it is a difficult job. Consequently, improvement has to be made.

In order to solve the aforementioned disadvantages due to problems of slime, the present inventors have performed extensive research on using chemical agents to treat it. As a result of this research, it was found that when a halogen-containing chemical agent that is adjusted for gradual addition is added to the waste solution, no slime is formed. As a result, problems of slime can be prevented entirely. In addition, when a heat exchanger is used, there is no decrease in heat efficiency over the long term, and there is no need for disassembling and cleaning. As a

result, the method for treating waste photographic developing solution of this invention was reached.

That is, this invention provides a method for treating waste photographic developing solution characterized by the fact that a halogen-containing chemical agent that is adjusted for gradual addition is added to the waste photographic developing solution to prevent problems of slime generated in said waste solution.

In the following, this invention will be explained.

In this invention, the waste photographic developing solution includes the waste photographic developing waste solution and the waste fixing solution containing gelatin, and discharged water generated in the water washing step.

Halogen-containing chemical agents that can be used in this invention include compounds that generate hypochlorous acid, hypobromous acid, or hypoiodous acid in water. Examples include halogen elements, including chlorine, bromine, and iodine; salts of hypochlorous acid, such as sodium hypochlorite, potassium hypochlorite, etc.; salts of hypobromous acid, such as sodium hypobromite, etc.; alkali metal salts, such as sodium salts and potassium salts, of trichloroisocyanuric acid and dichloroisocyanuric acid; organic compounds that can generate hypochlorous acid in water, such as dichlorodimethyl hydantoin, etc.; alkali metal salts, such as sodium salts and potassium salts, of tribromoisocyanuric acid and dibromoisocyanuric acid; organic compounds that can generate hypobromous acid in water, such as dibromodimethyl hydantoin, etc.; and compounds that can generate hypochlorous acid and hypobromous acid at the same time, such as chlorobromodimethyl hydantoin, etc. The aforementioned compounds may be added either alone or as a mixture to the waste photographic developing solution. In particular, a good effect can be realized when a bromine-containing chemical agent is added to a chlorine-containing chemical agent for use. For example, a mixture of dichlorodimethyl hydantoin and dibromodimethyl hydantoin is preferred. In this case, the effect of the chemical agent can last for a long time. Because of this advantage, problems of slime due to the waste photographic developing solution can be avoided.

Studies on the method for adding these chemical agents indicate that when the chemical agent is quickly added, the amount of the chemical agent consumed per unit time is large, and the cost is high. On the other hand, when the chemical agent is used intermittently, it is impossible to fully prevent generation of slime in the heat exchanger. On the other hand, if the chemical agent is added gradually, the efficiency is high, and the effect of preventing problems of slime can last for a long time.

As a method for adding the chemical agent of this invention, a means that can be adjusted for gradual addition is used. For example, one may use the method in which a bleaching powder with high solubility in water is used to prepare a concentrated aqueous solution, which is then

added dropwise to the pipeline. For a mixture of dichlorodimethyl hydantoin and dibromodimethyl hydantoin with low solubility in water, one may contain the mixture in a stick, tablet or a simple container which is then directly set in the pipeline or in a preparatory tank connected to the pipeline. The initial amount added is determined by trial and error according to the amount of gelatin and the amount of hypo in the waste solution as well as the addition amount of the halogen-containing chemical agent per unit water. That is, the conditions can be [appropriately] selected.

In the following, this invention will be explained in detail with reference to application examples.

Application example

3 sticks (30 g in each stick) of a solid 1:1 mixture of dichlorodimethyl hydantoin and dibromodimethyl hydantoin were placed in the front portion of the heat exchanger in a wastewater treatment system for photographic development/fixing/water washing operation equipped with a 25-L PUC-made preparatory tank for the heat exchanger (flow rate of about 60 L/min, operation time 10 h/day, and water temperature 30-33°C). In this state, waste solution treatment was performed for 10 days. In this treatment, about 60 g (corresponding to 2 sticks) were consumed, and slime did not form in the pipeline or heat exchanger. Consequently, a high efficiency was realized for the heat exchanger.

As a control, heat exchange was performed for wastewater under the same conditions but without using the chemical agent. It was found that slime formed in the pipeline and heat exchanger, the heat exchange efficiency decreased significantly, and it was necessary to disassemble and clean the heat exchanger after use.